THE SCARCITY OF WASPS.

THE correspondence in NATURE recently (October 12 and 26 and November 16) on the scarcity of wasps during the late summer and autumn of last year raises some interesting and difficult questions. In various parts of Great Britain—from Wigtownshire, Cheshire, and Gloucestershire to Kent—this scarcity has been observed, following on an abundance of queens in spring. The wet and cold conditions prevailing in spring and early summer are suggested as the explanation by most of the writers who contributed observations, and this inclement weather would naturally be accompanied by a scarcity of the insects—caterpillars, greenfly, diptera, etc.—on which wasps feed their grubs. In a letter to the *West Kent Advertiser* for November 24, Mr. G. W. Judge suggests that famine rather than cold was responsible for the mortality. Mr. W. F. Denning's definite observation (*supra,* p. 149) of the dying out of five nests of *Vespa vulgaris* near Bristol in June is noteworthy in this connection. Mr. A. O. Walker's theory that the queens of last year's spring were largely infertile would be difficult to support by observation. Mr. O. H. Latter[1] has suggested that a mid-winter with much "open" weather—such as prevailed in January, 1916—is deadly to queens by tempting them out of safe winter quarters. This cause can, however, scarcely be invoked to explain the paucity of autumn workers after a spring like that of 1916, rich in queens.

The fact that worker wasps were abundant enough in some places makes it likely that other factors affecting the numbers of these insects still require investigation. Mr. H. St. G. Gray wrote (p. 209, *supra*) that they were too plentiful on the Somerset hills, and they certainly swarmed in the neighbourhood of Dublin during September. Referring to past records, I find that 1897 and 1907 were years marked by great scarcity of wasps in Ireland; the latter of these summers, at any rate, was abnormally wet and cool.

Most writers in NATURE and elsewhere express satisfaction at the temporary reduction in the wasp population. The damage done by wasps to fruit is undoubtedly great in normal seasons, and they also take a valuable portion of our food-supply by their habit of robbing bee-hives of honey. On the other hand, as Mr. Latter and Mr. Denning point out, wasps are of considerable service in destroying multitudes of harmful insects, with which they feed their larvæ. The fierceness of wasps has been greatly exaggerated; unless attacked or annoyed, their disposition is placid, though one requires, perhaps, to be an admirer of the insects to be able to watch with serenity a dozen of them crawling over one's food. From the point of view of rural economy, it seems desirable to encourage wasps until the fruit season, and then to wage such war on them as may be found necessary.

GEO. H. CARPENTER.

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[1] "Bees and Wasps" (Cambridge University Press), p. 44.

NOTES.

ONE of the saddest incidents of the recent terrible explosion in a works engaged in refining explosives is the death of Mr. Andrea Angel, who was at the time acting as chief chemist and assistant-manager. The exact cause of the disaster is at present unknown, but it was preceded by an outbreak of fire. When the alarm was given, Mr. Angel, who was in his quarters, went at once to the scene of the fire and warned the operatives, many of whom undoubtedly owe their lives to his devotion to duty. Mr. Angel was born at Bradford in 1877. He was educated at Exeter School, from which he went to Christ Church, Oxford, as an exhibitioner. He took a first class in chemistry in the Honour School of Natural Science in 1899, was afterwards elected Dixon research scholar, proceeded to the degree of M.A. in 1903, and took the B.Sc. degree three years later. He acted for some years as lecturer in chemistry at Brasenose, and latterly at Christ Church, and was also tutor in chemistry to non-collegiate students. Shortly after the outbreak of war he gave up his work at Oxford and took up that on which he was engaged at the time of his tragic death. Mr. Angel was a fellow of the Chemical Society, and although the exacting duties of a college tutor left him little leisure for research, he was able to make several original contributions to the subject which have appeared in the Transactions of the society. He first published in 1902, in conjunction with his tutor, Mr. Harcourt, "Observations on the Phenomena and Products of Decomposition when Normal Cupric Acetate is Heated," and afterwards papers on "Cuprous Formate" in 1906 and on "The Isomeric Change of Halogen-substituted Diacylanilides into Acylaminoketones" in 1912. He was a man of a very lovable and unselfish nature, and will be greatly mourned by a wide circle of friends and old pupils.

AN important letter from Lord Blyth appeared in the *Times* on January 22 emphasising the necessity for the close co-ordination of science with practice in agriculture for the purpose of increasing the food production of the country. Lord Blyth's proposal is the immediate appointment of a Commission of men of science who shall devote their time exclusively to research in connection with the varying characteristics of the soil throughout the country, the crops most suited to each locality, the best methods of treating and manuring such land, the most suitable artificial manures to be used for each purpose, and the best substitutes for such of these as may be temporarily unobtainable by reason of scarcity or cost. As time is pressing the work should be put in hand at once and information promptly circulated through the War Agricultural Committees. This proposal will, we are sure, be received sympathetically on all sides, though, as a matter of fact, it is understood that such a Commission is already in process of formation. Throughout the war the agricultural colleges and experiment stations have rendered useful service, and have demonstrated more convincingly than ever the close connection between science and agriculture. Indeed, never before has agricultural science had so much recognition as now, either from farmers or from men engaged in pure science, and it is hoped that the new conditions will do much to strengthen still further the development of scientific agriculture in this country.

PARTICULAR attention is directed to the important letter which appears in another column from Prof. Eugenio Rignano, the well-known psychologist and editor of the Italian scientific monthly, *Scientia*. The question as to the establishment of year-books and international scientific journals in the countries of the

Entente is one of the most pressing at the present time. Hitherto, as is well known, we have been largely dependent on Germany for those yearly condensed and detailed reviews of progress in the different branches of science which form such an indispensable aid to all scientific workers. It is urgently necessary that the countries of the Entente should take a share—and perhaps the whole burden—of such publications in the future. Indeed, both because of the industrial harm that Germany has done us in the past by monopolising, to all intents and purposes, this department of scientific work, and because we ought certainly to overcome that inertia which German activity seems to impress on the rest of the world, it is very advisable to follow the leadership of commerce and produce more of the labour which is of such great use in science outside Germany. The present is the time for action, and we hope that Prof. Rignano's letter will meet with a ready response from those in power, as well as suggestions from British men of science.

Dr. Simon Flexner, director of the Rockefeller Institute for Medical Research, New York, has been elected a foreign associate of the Paris Academy of Medicine.

A proposal to introduce summer time again this year has been rejected by a majority of the Committee of the Prussian Diet, as it is considered that the change was a failure last year.

The death is announced, at seventy-one years of age, of Mr. A. E. Jamrach, widely known among zoologists as a dealer in wild animals, which he imported from all parts of the world for zoological gardens, menageries, and private persons. For a long time almost the whole of the wild beast trade, both in this country and on the Continent, was under Mr. Jamrach's control.

The death is announced, in his seventy-fifth year, of Dr. Henri Emile Sauvage, founder, and until recently director, of the Station Aquicole, Boulogne-sur-Mer. Dr. Sauvage studied fishes, both recent and fossil, from every point of view, and published a long series of memoirs and papers bearing both on zoology and geology, and on several economic questions connected with these sciences. From 1874 to 1883 he was assistant-ichthyologist in the Paris Museum of Natural History, and made many contributions to knowledge of the fishes of West Africa, Indo-China, and Madagascar. In 1891 he also contributed a large volume on the fishes of Madagascar to M. Grandidier's well-known work on that island. His most important writings on fossil fishes related to those of the French coal-bearing formations, but his smaller papers dealt with new species from many sources, among which may be mentioned Jurassic fishes from Catalonia (Spain) and from his own neighbourhood of Boulogne-sur-Mer. He was also for many years director of the Boulogne Museum, and took a deep interest in all local affairs. Dr. Sauvage was elected a foreign correspondent of the Geological Society of London in 1879, and a corresponding member of the Zoological Society in 1904.

The death, on January 16, of Mr. Benjamin G. Cole brings to a close a remarkably long period of service as hon. secretary of a local scientific society. The Essex Field Club was founded in 1880 by Mr. William Cole, A.L.S., who is still its hon. secretary; but, two years later, his brother, above-mentioned, became associated with him as assistant hon. secretary, and served for thirty-five years continuously. Mr. Cole, a son of the late Mr. Julius Cole, of the Trinity House, was approaching the age of seventy, and was unmarried. In his earlier days he was a very ardent entomologist. In company with his brother William, Prof. Raphael Meldola, Mr. E. A. Fitch, Mr. W. J. Argent, and others, he collected very actively, chiefly in the fields (now built over) around Clapton, in Epping Forest, on the Essex marshes, and elsewhere. The pages of the *Essex Naturalist* and the entomological journals record not a few of his more interesting captures. Of late years his collecting was done mainly on the saltings and marshes around St. Osyth, where he lived in an old Martello Tower, converted into a dwelling, which enjoys a remarkably fine and extensive view over sea, land, river-mouth, and adjacent islands. Mr. B. G. Cole also assisted his brother as hon. curator of the Epping Forest Museum at Chingford.

The death of Prof. J. B. Auguste Chauveau, which we announced in our issue of January 11, removes from among us one of the most famous and many-sided biologists of our time. He was born in 1827, and at the age of twenty-one was elected on the staff of the Lyons Veterinary School, of which he became director in 1875. He was later appointed Inspector-General of Veterinary Science in France, and at the time of his death he was professor of comparative pathology at the Paris Natural History Museum, where he built a new institute for the study of comparative physiology and pathology. His pathological work dealt mainly with the nature of contagion and of viruses, and included important work on tuberculosis, septicæmia, and smallpox. His treatise on the comparative anatomy of the domesticated animals is a monument to his fame as a veterinarian, but he is perhaps best known as one of the makers of physiology during the latter half of the last century, and one of the founders of the *Journal de Physiologie et Pathologie Générale*. Although he did work on the biochemical side (glycogenesis and sugar utilisation), the mechanical side more especially was his *forte*; the cardiac sound of Chauveau and Marey, and the dromograph of Chauveau and Lortet, are classical instruments which did much to perfect our knowledge of the circulation, and will live in scientific history. Personally he was an attractive figure; his fine presence was striking, his amiable characteristics made him much beloved, his untiring energy, even until late years, and his catholicity of outlook inspired the young generation of investigators who came in contact with him. Such men the world can ill spare.

The report of the Bristol Museum and Art Gallery for the past year indicates that in spite of the war steady progress has been continued. Many convalescent soldiers have made use of the institution, and one Australian, invalided to England, has presented a collection of beetles made while he was on service in Egypt. A special exhibition of flowers, fruit, and insects to commemorate the Shakespeare tercentenary was on view, and to this department the late Mme. G. Jervis presented valuable botanical works. The insect collection has been rearranged, and is now more than of local importance. The inclusion of the Channing Pearce collection of fossils from the Great Oolite, Bradford Clay, and Forest Marble of the west of England is of great value as an addition to the older series. A collection of sketches in oils illustrates events in the past history of the city.

Prof. Flinders Petrie publishes, in *Ancient Egypt*, part iv. for 1916, an important paper on "Funereal Figures in Egypt." To reach the beginning of the use of such figures he goes back to existing beliefs in Africa, where the love and veneration of the family still remain in full force. Hence a token in some form of the dead is preserved in the household. The Egyptians seem to have retained the savage custom of keeping in the family the head of the deceased. For his benefit, however, it was held necessary to return it to the grave; and the next stage was the provision of a stone image of the head in the grave, in case the actual head was lost or injured. The stone mummy figures appear at first as a plain, bandaged mummy, without any hands or detail except the face, which gave it personality. It is on rough wooden figures of the Seventeenth Dynasty that the wood *shuabti*, whence came the name of the well-known Ushabti figures, first appears. Prof. Petrie gives a fine series of illustrations of the later developments of these figures, and provides a transcript and translation of the formulæ inscribed upon them.

THE *Indian Journal of Medical Research* for October, 1916 (vol. iv., No. 2), contains valuable papers on the epidemiology of malaria in Malaya and on anopheline mosquitoes by Mr. C. Strickland. Mr. E. H. Hankin details several simple tests for narcotic and anæsthetic drugs which should be of much use. Major Harvey discusses birth and marriage rates and fertility among Brahmins and Indian fighting communities. Capt. Fox describes experiments undertaken to ascertain the relative values of the various kinds of cholera vaccines. The most effective seems to be a heated vaccine without phenol, the next in order being living culture. A useful feature of the number is a summary of recent medical research in Germany dealing with dysentery, epidemic jaundice, paratyphoid fever, and methods of cholera diagnosis.

THE prize essay on "A Scheme for Maternity and Child Welfare Work," by Miss Isabel Macdonald and Miss Kate Atherton, is published by the Royal Sanitary Institute, price 1*s*. The essay is divided into two parts: (1) preliminary organisation, and (2) the scheme in operation. For a typical district with, say, 2500 births a year, the cost per annum for such a scheme is estimated at 1230*l*. for staff and 1500*l*. for buildings (rent, rates, upkeep, etc.). The accommodation suggested comprises (*a*) waiting-room; (*b*) dressing-room; (*c*) weighing- and recording-room; (*d*) one or two consulting-rooms; (*e*) isolation-room; (*f*) dispensary; (*g*) office; (*h*) staff rooms and offices; (*i*) sanitary accommodation. As regards the scheme, it is remarked that ante-natal care can only be dealt with incidentally, as no machinery exists for the notification of pregnancy. This difficulty might, however, be met to some extent by co-operation with the district visitors of religious denominations. The compulsory notification of births enables the health visitors of the centre to visit the home within two or three days of the notification. Teaching would be given to mothers and voluntary workers on the feeding and health of children and general care of the infant. Infant consultations with a supply of milk and medicine would be available at the centre. Health lectures, day nurseries, and many other activities in connection with the centre are dealt with.

THE question of the physiological aspect of mountaineering is discussed at some length in a paper by Dr. A. M. Kellas on a consideration of the possibility of ascending the loftier Himalaya (*Geographical Journal* for January, xlix., No. 1). The physiological difficulties depend upon the deficiency of oxygen. The evidence from balloon ascents to high altitudes would tend to prove that the ascent of peaks of 28,000 ft. or 29,000 ft. would be impossible, but the balloonist ascends so rapidly that he has no opportunity of becoming acclimatised. The fact is of fundamental importance, for experience has shown that men can become accustomed to air deficient in oxygen. The case of Pike's Peak (14,109 ft.) is cited. Four factors concerned in acclimatisation to high altitudes are: first, the oxygen pressure in the alveolar air which rises; secondly, the number of red-blood corpuscles and the quantity of hæmoglobin in the blood, which increase in due proportion to each other; thirdly, the possibility of actual secretion of oxygen in the lung epithelium; and, fourthly, the more rapid circulation of the blood-stream during exercise. The conclusion which Dr. Kellas arrives at, after discussing these factors, is that towards the summit of Mount Everest (29,141 ft.) the climber would probably be near his last reserves in the way of acclimatisation and strength, but that he could accomplish the feat provided that the physical difficulties above 25,000 ft. are not insuperable.

THE Proceedings of the United States National Museum, vol. li., 1916, contains a long report, by Messrs. C. H. Gilbert and C. L. Hubbs, on the Japanese Macrourid fishes collected by the U.S. Fisheries steamer *Albatross* in 1906, with a synopsis of the genera. The authors find themselves in disagreement with previous workers on this group of fishes, not merely in the matter of nomenclature, but also on the more important questions of classification and the characters on which this is founded. They regard the branchiostegal rays as being more trustworthy than the dentition. The serration of the dorsal spine they also regard as affording a valuable character, while the position of the coracoid foramen, used by Regan and others, they consider as of no generic value in this group. But it remains to be seen whether the purely superficial characters adopted as a systematic basis in this report will stand the test of time.

THE Annals of the South African Museum (vol. xv., part v.) is devoted to the description of some South African Ichneumonidæ, and new, or little-known, Orthoptera. The account of the Ichneumonidæ has been written by Mr. Claude Morley, who describes several new species. Dr. L. Péringuey is responsible for the section on the Orthoptera. He describes a number of new genera and species of the families Acrididæ and Locustidæ. In his account of the remarkable and non-saltatorial Pneumorinæ he makes some interesting remarks on their powers of stridulation. Camping, on one occasion, in a waterless spot near the seaboard of Saldanha, he tells us, the deep voice of *Bulla immaculata* could be heard above the din made by innumerable geckoes, occupying clumps of reeds growing in this sandy spot. This was just after rainfall, when the noise made by the lizards was like the croaking of countless frogs. Dr. Péringuey also makes some noteworthy observations on the coloration of these extraordinary insects. His paper is illustrated by several text-figures and one plate.

IN the Journal of the Washington Academy of Sciences (vol. vi., No. 20) Mr. T. Wherry publishes the results of an interesting investigation on the soil conditions favoured by the walking fern, *Camptosorus rhizophyllus*. This fern, it is always stated, prefers a calcareous habitat. In the course of the present investigation, however, it has been collected not only on limestone, but also on granite, shale, sandstone, tree-trunks, and other substrata not usually classed as calcareous. Chemical analysis has shown that the actual soils in which the fern grows are rather high in their percentage of both total and soluble lime. Rocks with much lime suffer leaching during soil formation, and those poor in lime gain it through the decay of vegetable matter, and the average lime content of the soil on which the walking fern was found was about 4 per cent. The occurrence of chalk-loving plants therefore does not necessarily indicate the presence of lime in the underlying rock strata, except in cases where circumstances preclude the accumulation and decay of vegetable matter, and the resulting accumulation of lime in the soil. This investigation throws some light on the question of rhododendrons growing on limestone rocks referred to in NATURE of November 2, 1916 (p. 171).

MR. LEONARD HAWKES, in a paper on "The Building-up of the N. Atlantic Tertiary Volcanic Plateau" (*Geological Magazine,* 1916, p. 385), shows that the numerous red partings in the basaltic series of Iceland are due to layers of glassy volcanic dust. Similar dust is often carried over wide areas of the lava-deserts by wind-storms at the present day. The colour is due to oxidation, which here seems unconnected with any tropical climatic cause. The connection of a red layer with underlying decomposition of the basalt, as is the case in the great red zone in Co. Antrim, has not been proved in Icelandic observations.

GEOLOGISTS as well as mineralogists will always find new suggestions in Mr. W. T. Schaller's "Mineralogic Notes." In Series 3 (Bull. 610, U.S. Geol. Survey, p. 106, 1916) a new member of the melilite group is described under the name of Velardeñite, and the whole group is then discussed. A graphic tabulation of analyses indicates that melilite, which has hitherto occupied a very uncertain position, is an isomorphous mixture of åkermanite and sarcolite. On p. 138 an illustrated note deals with the giant crystals of spodumene in the pegmatites of the Black Hills, S. Dakota. These are often 30 ft., and may be 42 ft., long, and are about 4 ft. in diameter.

THE restrictions on the export of coal from the British Isles and its rising price are having serious results in Scandinavian countries. The deposits of coal at Andö, in the Vesteraalens, are of small importance, but are the only ones in Norway. Lately, however, Norway has sought to overcome her difficulties by the purchase from an American syndicate of vast coalfields in Spitsbergen. The coal, although of Tertiary origin, is of good steam quality. Lignite has been known in Iceland for some time, but so far has had no economic value. However, according to *La Nature* (December 16, 1916), a Danish company is now extracting large quantities at Stalfjall, in the north-west of the island, both for local use and for export to Norway. The lignite occurs in bands of clay among basaltic strata, and its average depth is only six metres. Iceland should have no difficulty in exporting large quantities of this lignite provided it proves sufficiently useful to be in demand. It is said to occur among the same basalts in the Faröe Islands.

IN the *Geographical Journal* for December (vol. xlviii., No. 6) Mr. R. C. Mossman has an important paper on the physical conditions of the Weddell Sea. The paper is based on the work of the *Scotia* and the *Deutschland,* the only two ships which had scientifically explored the Weddell Sea previously to the *Endurance,* the work of which is, of course, not yet available. The observations from the South Orkneys observatory have also been utilised. In meteorology the most striking results are the correlations which Mr. Mossman has been at pains to work out between temperature and pressure conditions in the Weddell Sea and those in other parts of the southern hemisphere, and even in Iceland. For the last twelve years the August and September temperatures at the South Orkneys have been a direct index to the temperatures at Kimberley, South Africa, during the three months following, and there is also a marked sympathy between the South Orkneys barometric pressure in December and the height of the River Parana at Rosario, which is, of course, dependent on the rainfall over southern Brazil, and this is related to the barometric pressure. In December there is a marked tendency for high pressure to the south and south-east of Cape Horn, and Mr. Mossman suggests that when the Graham Land lobe of the Antarctic anticyclone is intensified the pressure over the interior of Brazil is correspondingly diminished, and *vice versa.* More remarkable perhaps is the pronounced opposition between the barometric pressure at Stykkisholm, Iceland, and the South Orkneys. Data from 1902 to 1914 show no break in this sequence.

THE nature of the particles of mineral matter which become embedded in the lung tissue in cases of miners' phthisis has been determined by Drs. W. Watkins-Pitchford and J. Moir by microscopical examination in polarised light of specially prepared sections of silicotic lungs, their results being given in Publication No. VII. of the South African Institute for Medical Research (Johannesburg, 1916). In polarised light the field is suggestive of a starlit sky, but in ordinary circumstances only the larger particles are so visible. The particles have the form of irregular and angular, more or less elongated, chips or flakes, the majority being less than 2 microns in diameter, and very rarely reaching as much as 14 μ. The smaller flakes, when lying flat, have not sufficient thickness to react on polarised light, and they are only seen as streaks when they are set edgeways (the light then traversing a longer path through the doubly refracting medium). Further, the particles are obscured by the tissue in which they are embedded. The method previously adopted of destroying the lung tissue by means of hydrochloric acid and potassium chlorate also resulted in the destruction of some of the mineral matter. This objection is overcome by treating the sections with nitric acid or strong hydrobromic acid. Such prepared sections were compared with preparations of the dust collected from the air in the Rand gold mines and of the powder obtained by finely grinding the rock ("banket") from these mines. The mineral species identified include quartz (constituting more than 99 per cent. of the particles), sericite-mica, rutile, zircon, and tourmaline, and perhaps chlorite. Similar particles of mineral dust were also detected in the tissue of normal lungs; for example, the two lungs of a farmer, who had never worked in the mines, were estimated to contain a hundred thousand million particles of foreign mineral matter, whereas in the lungs of a miner affected with the disease the estimate reaches the appalling number of twenty to thirty millions of millions of such particles.

THAT the zodiacal light owes its origin to the remains of comets captured by Jupiter was the theory proposed fairly recently by Fessenkoff. A criticism of this theory is now given by G. Armellini in the *Atti dei Lincei,* xxv. (2), 9, in which it is shown that one formula arrived at by Fessenkoff is in direct opposition to an analogous one given by Schiaparelli in 1871. The author is, however, led to accept a modification of Fessenkoff's theory in which collisions between the meteoritic material of the captured comet play an important part.

IN the *Atti dei Lincei,* xxv. (2), 10, Mr. G. Körner and Dr. A. Contardi describe the properties of the sixth form (eta) of trinitrotoluene, recently discovered by them, as announced in a previous number of the *Atti* (xxiv. (1), 9, May, 1915). In arriving at the preparation of this new trinitrotoluene it was not possible to have recourse to direct nitrification, and it was therefore necessary to employ the substitution of an amidic group with a nitroxyl in a convenient dinitrotoluidine. Of these latter, three were suitable for leading to the necessary transformation. An additional result obtained by these authors was the production of 60 per cent. of one of the dinitrotoluidines, of which previously it had been only possible to obtain 20 per cent. from the material employed. The paper also describes the properties of a considerable number of the corresponding dinitrotoluene halogen compounds.

A PAPER by Dr. S. Brodetsky, on the longitudinal initial motion and forced oscillations of a disturbed aeroplane, appears in the *Aeronautical Journal* for October–December, 1916 (No. 80). The main conclusion is that "the ideal aeroplane is one that combines the following characteristics: large velocity, small angle of attack, small ratio area/load, small tail fairly far behind the main plane, and considerable margin of stability." The practical man will probably say that this is what common sense would predict, but it is interesting to see how these conclusions follow mathematically from a few simple assumptions, and the history of modern aviation shows that they have not always been acted upon. As in the case of a balance, the increase of one virtue involves the decrease of another, and we have to make a compromise; examples of this will be found in the paper. Fortunately stability and speed go together, and the disturbing elements, in all probability, will be gradually eliminated in the case of rapid machines. Then will come the problem of combining comparatively low speed with sufficient stability: a question of design, as in the case of a bicycle. Prof. G. H. Bryan has contributed an interesting introduction.

IN the Journal of the Franklin Institute for December last Mr. I. Langmuir describes a new form of exhaust pump for the production of high vacua, which he proposes to call the "condensation pump." It may be constructed of metal or of glass. The metal form of the pump consists of a tall cylindrical vessel containing a shallow pool of mercury, which is heated electrically and gives off mercury vapour. The upward stream of vapour is concentrated towards the centre of the vessel by an inverted funnel, and on issuing from the funnel strikes the under surface of a bell-shaped deflector, which sends it downwards along the outer walls of the upper portion of the containing vessel. The space above the bell is in communication with the vessel to be exhausted, and the moving mercury vapour drags along with it the gas from this vessel. The outer wall of the containing vessel along which the mixture passes is cooled by an outer water-jacket, and the mercury vapour is condensed on it, and runs down into the pool at the bottom of the vessel. The gas continues its motion, and is taken from the lower part of the vessel by an auxiliary pump giving a pressure of 200 to 600 bars. A pump of this form, 7 cm. in diameter, exhausts 3000 c.c. of gas per second, and will reduce the pressure to 10^{-5} bar (1 atmosphere $= 10^{6}$ bar).

A COPY of the "List of Publications of the Carnegie Institution of Washington," issued on December 1 last, has been received. Copies of each publication, except the monthly issues of the "Index Medicus," are sent gratuitously to a carefully selected list of the greater libraries of the world, while the remainder of the edition is offered for sale at a price sufficient only to cover the cost of publication and the carriage to purchasers. Persons desiring price lists or descriptive lists as issued may have them by applying to the Carnegie Institution of Washington. The catalogue received contains both price and descriptive lists, and the latter is a most useful guide to the character and precise contents of each of the volumes indexed, so that would-be purchasers may know exactly the kind of book they are ordering.

MR. LEONARD HUXLEY, who, it will be remembered, was his father's biographer, has written for early publication by Messrs. Smith, Elder and Co. "The Life and Letters of Sir J. D. Hooker, O.M., G.C.S.I."—a work which is sure to be of interest to very many readers of NATURE. It will be illustrated by photogravures and be in two volumes.

A SECOND and much enlarged edition in two volumes of Mr. A. Marshall's "Explosives: their Manufacture, Properties, Tests, and History," is to be brought out by Messrs. J. and A. Churchill. The first volume, containing a portrait of the Prime Minister, to whom the work is dedicated, will be published almost immediately. The work as originally published was reviewed in NATURE of June 3, 1915, and the author contributed an additional chapter, under the title of "The Nature of Explosives," to our issue of February 3, 1916.

OUR ASTRONOMICAL COLUMN.

ECLIPSES OF JUPITER'S SATELLITES.—In Harvard Circular No. 198 Prof. E. C. Pickering directs attention to the need for continued observations of the eclipses of Jupiter's satellites. He points out that the observations are easy and interesting, and such as can readily be undertaken by amateurs. While the probable error of a photometric determination of the time of an eclipse is about 2 seconds, the average deviation from the time computed by the tables of Prof. Sampson is about 7 seconds. These deviations appear to be real, and a possible explanation is that the apparent diameter of the planet, and therefore of its shadow, varies with the cloudiness of the Jovian atmosphere. Several independent observations tending to confirm large deviations from theory would thus be valuable.

PECULIAR STELLAR SPECTRA.—In a paper read at the nineteenth meeting of the American Astronomical Society Miss Cannon directed attention to some of the peculiar spectra which had been noted in the preparation of the New Draper Catalogue (*Popular Astronomy,* vol. xxiv., p. 656). It appears that while less than one-fifth of one per cent. of the 218,000 stars which have been classified fall outside the classes B, A, F, G, K, M, many stars which may be classed in these divisions show abnormal features. In all classes some stars have been found which show lines of unusual intensity; thus several hundred additional stars have been found to show the silicon lines $\lambda 4128$ and $\lambda 4131$, or the strontium line $\lambda 4077$, stronger than normal. The latter group is of special interest, as $\lambda 4077$ was the first line shown by Adams to be related in intensity to the absolute magnitudes of the stars. In C.P.D. $-59°$ 3038, mag. 7·2, a line near $\lambda 3869$, which may be a reversal of a well-known nebular line, has been found to be very strong. Real changes in the spectra of several stars have also been observed; thus in η Carinæ, as photographed in 1895, the hydrogen lines were stronger, and other bright lines fainter, than on the more recent plates. An extreme case of variation is R. Scuti, which ranges from G5 at maximum to Mb at minimum. The only new type of spectrum which has been found is that exhibited by the very red star B.D. $+43°\cdot 53$, the spectrum consisting entirely of light near the region of H_{α}, and the colour-index amounting to 5·4 magnitudes. This and